ANALYTICAL RESULTS FOR
RICO-ARGENTINE MINE
RICO, ARGENTINE
TDD# R8-8502-09

EPA PROJECT OFFICER: DAVE SCHALLER
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SUBMITTED TO: KEITH SCHWAB - FIT DPO

DATE SUBMITTED: July 29, 1985

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ANALYTICAL RESULTS FOR
RICO-ARGENTINE MINE
IN RICO, COLORADO

I. INTRODUCTION

This report was prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8502-09 issued to Ecology and Environment, Inc. Field Investigation Team (E&E FIT) by the Region VIII Environmental Protection Agency (EPA). The report describes analytical data resulting from sample collection at the Rico-Argentine Mine on November 14, 1985. The purpose of this sampling effort was to evaluate the extent of contamination that has occurred as a result of past mining activities at the Rico-Argentine Mine. Sampling focused on possible contamination of surface water.

The Rico-Argentine Mine is located north of Rico, Colorado and is an inactive operation owned by the Anaconda Minerals Company. Initially, the chief metal produced in the Rico District was silver. There was a switch to pyrite for sulfuric acid production during the 1954 uranium boom and a sulfuric acid plant was built. Operations consisted of a mill and tailings pond on Silver Creek and an acid plant, cyanide heap leach, and settling ponds on the Dolores River. There were two discharge points associated with the operation. Discharge point 001 was the discharge from the Blaine Tunnel on Silver Creek. There is no longer discharge from 001 because it is redirected underground to the St. Louis Tunnel where it drains into the St. Louis Settling Pond System on the Dolores River. The outfall of the final pond into the Dolores River is discharge point 002.

In April of 1984, Anaconda Minerals Company put into effect a water treatment operation at the St. Louis Tunnel. The operation consists of neutralization using slaked lime.

The city of Rico receives its drinking water supply from Silver Creek above the major mining impacts. The water is treated through infiltration galleries and chlorinated. The site is discussed further in FIT's Site Visit Report and Sampling Plan (TDD R8-8408-17) and the Sampling Activities Report (TDD R8-8411-02). The site location map is shown in Figure 1.

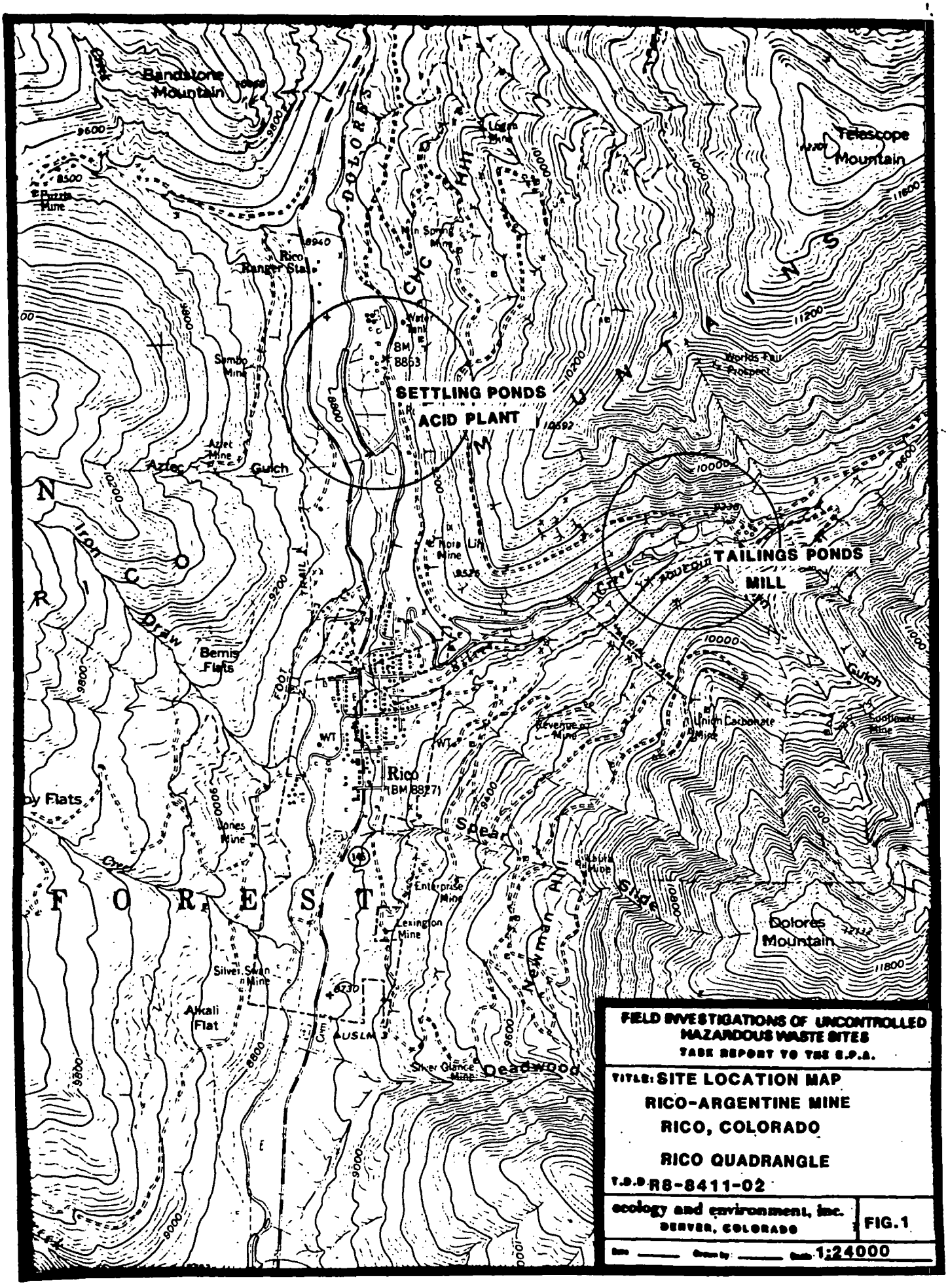
II. QUALITY ASSURANCE REVIEW

All surface water samples were analyzed by Rocky Mountain Analytical Laboratory (RMA) in Arvada, Colorado. The surface water samples were analyzed for cyanide, sulfate and Task 1 and 2 metals including both total and dissolved analyses. The review of methodology and results was performed by John Graves and Lynn Roberts, both of E&E FIT. The inorganic data produced by RMA were found acceptable for use with one qualification. The holding time for cyanide exceeded the contract requirement. The data will be presented but footnoted as per the previous comment.

All sediment samples were analyzed by the Radian Corporation in Austin, Texas. The sediment samples were analyzed for Task 1 and 2 metals. The review of methodology and results was performed by Lynn Roberts, of E&E FIT. The data were found acceptable for use with several qualifications. The holding time for mercury was exceeded by 2 months. The matrix spike recoveries for antimony, selenium, thallium (recoveries were at 0%) and beryllium, nickel, silver and tin were not within the contract required recoveries. Finally, chromium was detected in the blank at 7.0 mg/kg. The data will be presented but footnoted as per the previous comments. See Appendix A for the complete QC Summary Report.

III. ANALYTICAL RESULTS

Analytical results for the Rico-Argentine Mine sampling effort have been tabulated below. The analyses of the total inorganic



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

TASK REPORT TO THE E.P.A.

TITLE: SITE LOCATION MAP
RICO-ARGENTINE MINE
RICO, COLORADO

RICO QUADRANGLE

T.D.# R8-8411-02

ecology and environment, inc.
DENVER, COLORADO

FIG. 1

Date ____ Drawn by ____ Scale 1:24000

parameters and the dissolved inorganic parameters in surface water are presented in Table 1 and 2, respectively. The analyses of inorganic parameters in sediment are provided in Table 3. Water Quality Standards for the Dolores River and Silver Creek are presented in Tables 4 and 5, respectively. The National Interim Primary and Secondary Drinking Water Standards and Criteria are provided in Table 6. Location of all samples are shown in Figure 2.

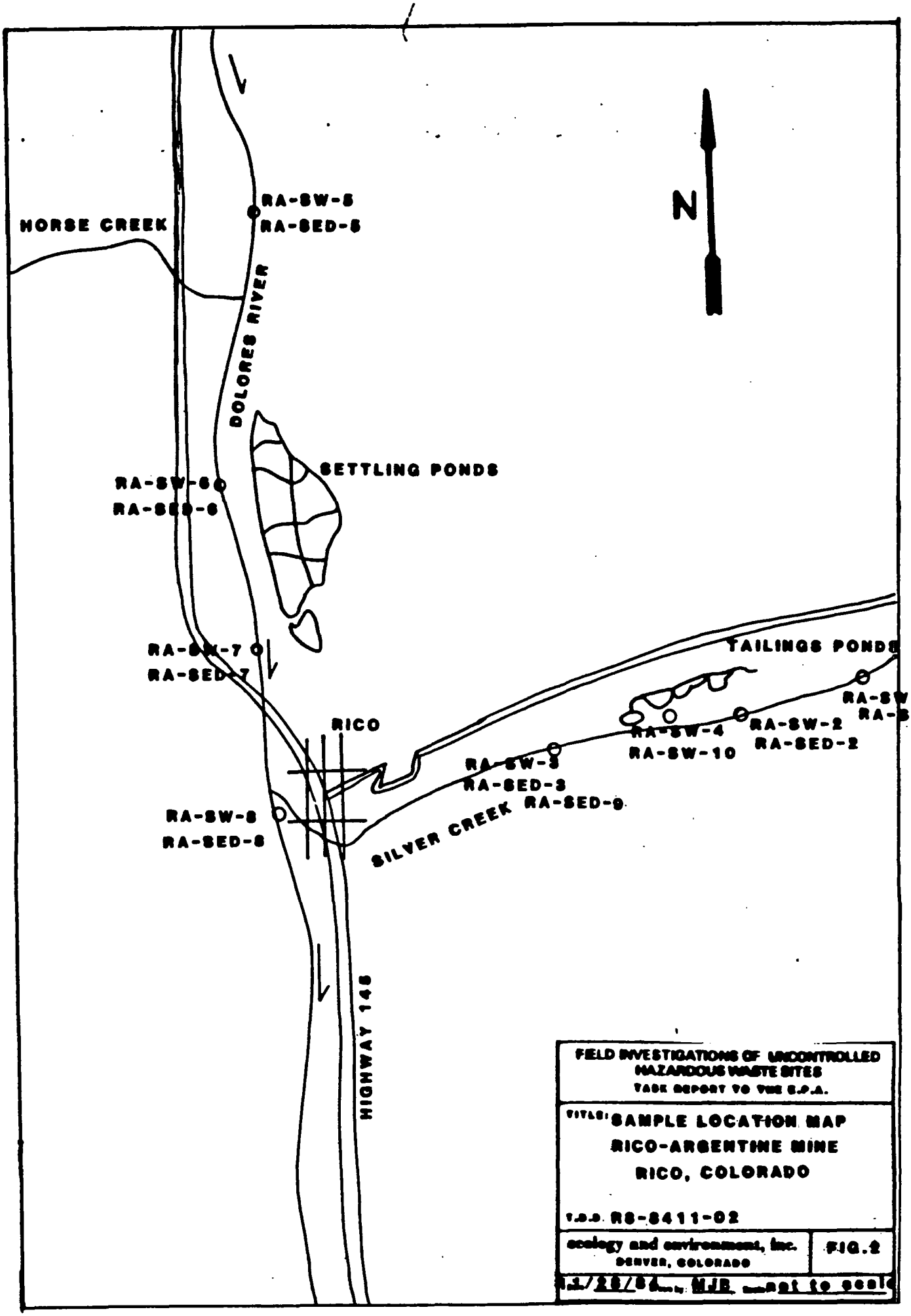
IV. INTERPRETATION OF RESULTS

Water samples from streams were compared with the drinking water standards and criteria in Table 6. The standards are legally enforceable, while criteria are recommended levels. Some elements such as calcium, magnesium and potassium do not have criteria. It is important to emphasize that these waters are apparently not used as drinking water sources. The comparison is made as a measurement of water quality degradation. In comparing drinking water standards to samples, dissolved concentrations of surface water are used. the drinking water standards are also reported in dissolved concentrations.

There were no occurences of any standards being exceeded in Silver Creek. Leachate samples RA-SW-4 and duplicate RA-SW-10 had concentrations of beryllium, iron, manganese and zinc that exceeded the criteria. Surface water sample RA-SW-3 had manganese concentrations that exceeded its criteria. RA-SW-4 and RA-SW-10 had sulfate concentrations that were 700,000 ug/l greater than the background surface water sample.

There were no occurrences of any standards being exceeded in the Dolores River. Surface water sample RA-SW-6, RA-SW-7 and RA-SW-8 all had concentrations of manganese that exceeded the criteria level.

Water samples from streams were also compared with water quality standards for the Dolores River and Silver Creek. These standards are not control regulations, but are data put out by the Colorado


HORSE CREEK
RA-SW-5
RA-SED-5
DOLORES RIVER
N
SETTLING PONDS
RA-SW-6
RA-SED-6
RA-SW-7
RA-SED-7
TAILINGS PONDS
RA-SW-1
RA-SED-
RA-SW-4
RA-SW-10
RA-SW-2
RA-SED-2
RICO
RA-SW-3
RA-SED-3
RA-SED-9
RA-SW-8
RA-SED-8
SILVER CREEK
HIGHWAY 145
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.
TITLE: SAMPLE LOCATION MAP
RICO-ARGENTINE MINE
RICO, COLORADO
T.D.D. R8-8411-02
ecology and environment, inc.
DENVER, COLORADO
FIG. 2
12/28/84 MJB not to scale

Department of Health (CDH). The CDH reports standards in total concentration. In comparing standards to samples, total concentrations of surface water are used. On Silver Creek, RA-SW-4 and duplicate RA-SW-10 which are leachate samples from tailings exceeded criteria for cadmium, copper, iron, lead, manganese, silver, zinc. There are no sulfate standards for Silver Creek. On the Dolores River, no criteria were exceeded. There are no sulfate standards for the Dolores River.

Sediment samples from Silver Creek and the Dolores River were collected form each surface water sampling location. In Silver Creek, concentrations of arsenic, cadmium, copper, iron, lead, manganese and zinc were detected in the downgradient samples (RA-SED-2, RA-SED-3, RA-SED-9) in much higher quantities than the upgradient sample (RA-SED-1). In the Dolores River, concentrations of arsenic, cadmium, copper, iron, lead, manganese and zinc were detected in the downgradient samples (RA-SED-7 and RA-SED-8) in much higher quantities than the upgradient sample (RA-SED-5).

V. CONCLUSION

The surface water data from RMA were found acceptable for use with one qualification. The holding time for cyanide was exceeded by one month. The sediment data from Radian were found acceptable for use with several qualifications. The holding time for mercury was exceeded by two months, matrix spike recoveries for six compounds were less than the acceptable limit and chromium was found in the blank.

When interpreting the surface water data from both Silver Creek and the Dolores River, it seems that the only compound of high concentration in downstream waters is manganese. The leachate from the Silver Creek tailings ponds appears to be diluted in a short distance.

The sediment data shows concentrations of metals that are clearly greater than the upstream samples. It is apparent that the metals are either precipitating from solutions or are being transported clastically. A strong coorelation can be made between metals found in downstream samples and mining operations. An extensive sediment sampling effort might be useful at this site.

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 374969

SITE NAME: RICO ARGENTINE/RICO POND

DOCUMENT DATE: 07/29/1985

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☑ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

TABLES 1 through 5 (See Table of Contents)

Contact the Superfund Records Center to view available document.
(303) 312-6473

TABLE 6: NATIONAL INTERIM PRIMARY AND SECONDARY DRINKING WATER STANDARDS AND CRITERIA

I. From: National Interim Primary Drinking Water Regulations, EPA - 570/9-76-003 (USEPA, 1976a).

Arsenic	50 ug/L
Barium	1000 ug/L
Cadmium	10 ug/L
Chromium	50 ug/L
Lead	50 ug/L
Mercury	2.0 ug/L
Selenium	50 ug/L
Silver	50 ug/L

II. From: U.S. EPA Water Quality Criteria, Federal Register 45 (231) (U.S. EPA, 1980).

Antimony	146 ug/L
Beryllium	0.037 ug/L
Copper	1000 ug/L
Nickel	13.4 ug/L
Thallium	13 ug/L
Zinc	5000 ug/L

III. From: U.S. EPA Quality Criteria for Water (1976b)

Iron	300 ug/L
Manganese	50 ug/L

IV. From: Drinking Water and Health, Safe Drinking Water Committee (1980)

Aluminum	5000 ug/L

APPENDIX A

FORM A

QC SUMMARY REPORT

REGION VIII CONTRACT LAB DATA

Project # ~~R8-8411-02~~ 8502-09

Data Reviewer Lynn M Roberts / John Haines

Date of Review 2/12/85

Contractor Laboratory Rocky Mtn Analytical Lab.

Case No. 3549 Matrix Water

Site Rico-Argentine Mine

Sample No.

MH 0706	0711		
0707	0712		
0708	0713		
0709	~~0715~~ 0714		
0710	0715		

(✓) Data are acceptable for use

( ) Data are acceptable for use with qualification noted above

( ) Data are preliminary - pending verification by contractor laboratory

( ) Data are unacceptable

Following are our findings:

These data are of good quality except possibly the cyanide results. The cyanide holding time was exceeded by about 1 month. Therefore, the cyanide results must be considered as estimated concentrations.

E&E Form 6/84-1

Form A

Inorganic Data Completeness Checklist

- ✓ Inorganic analysis data sheets
- ✓ Instrument Detection limits
- ✓ Duplicate results
- ✓ Spike results
- ✓ ICP interference check sample
- ✓ Blank results
- ✓ Raw data for calibration standards
- ✓ Raw data for blanks
- ✓ Raw data for samples
- ✓ Raw data for duplicates
- ✓ Raw data for spikes
- ✓ Initial calibration and calibration verification results
- ✓ Continuing calibration verification

Form B

All inorganic standards were within specified contract limits.

Yes ✓ No _____

Comments: Thallium continuing calibration was slightly low on 1-24-85.

All inorganic detection limits met the contract requirements.

Yes ✓ No _____

Comments:

All matrix spike requirements were met.

Yes _____ No ✓

Comments: Selenium recovery was 69%

The interference check sample was run twice per eight hour shift. No massive interferences were present.

Yes ✓ No _____

Comments:

Form C

A blank was run with every twenty samples or less per case.
Yes ✓ No ____

How many elements were detected above the required detectionlimit? 0

How many elements were detected at greater than one half the amount detected in any sample?: 0
Comments:

A duplicate sample was run with every twenty or fewer samples of a similar matrix, or one per case, whichever is more frequent.
Yes ✓ No ____

The RPD's were tabulated.
Yes ✓ No ____
Comments:

All holding times were met.
Yes ____ No ✓
Comments: Cyanide holding times were exceeded. The cyanide results must be considered as estimates.

E+E PO

REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

Case No. 3549 Project No. _____

Site ~~Bakers Park~~ Rico Argentine

Contractor Laboratory Radian

Data Reviewer JM Roberts Date of Review 5/15/85

Sample Matrix Soil

Sample No.

sed 3 MH0529	sed 7 MH0703		
sed 5 MH0530	sed 8 MH0704		
sed 4 MH0531	sed 9 MH0705		
sed 1 MH0599			
sed 2 MH0600			

( ) Data are acceptable for use.

(✓) Data are acceptable for use with qualification noted ~~above~~ below

( ) Data are preliminary - pending action or verification

( ) Data are unacceptable

Action required by DPO?

No ✓ Yes ____ Following items require action _____

_____

Action required by Project Officer (PO)?

No ✓ Yes ____

Several elements are flagged with an "R" because of poor spike recovery. It should be noted that antimony, selenium, and thallium had zero spike recovery. Arsenic was flagged with an "R" by lab personnel. However according to the criteria listed on page E-6 of SOW 784, arsenic should not be flagged.

Chromium was detected in the blank at 7 mg/kg. Because of this, chromium results were flagged with a "B".

Form B

All inorganic standards were within specified contract limits.

Yes ___ No ✓

Comments: Three standards were analyzed. One standard had low %R for several elements. The limit is ± 20%.

Arsenic	29%
Cadmium	76%
Chromium	79%
Nickel	79%

All inorganic detection limits met the contract requirements.

Yes ✓ No ___

Comments:

All matrix spike requirements were met.

Yes ___ No ✓

Comments:

Zero spike recovery for Antimony, Selenium, and Thallium.

Beryllium	74%	These elements are flagged with an "R".
Nickel	150%	
Silver	70%	
Zinc	330%	

The interference check sample was run twice per eight hour shift. No massive interferences were present.

Yes ✓ No ___

Comments:

The initial %R for vanadium was 128%. This is outside of the ± 20% limit. However, the final percent recovery was within the control limit (108%)

Form C

A blank was run with every twenty samples or less per case.

Yes ✓ No ____

How many elements were detected above the required detection limit? 1

Chromium was detected at 7.0 mg/kg, the detection limit was 5 mg/kg.

How many elements were detected at greater than one half the amount detected in any sample?: 1

Comments:

Chromium

A duplicate sample was run with every twenty or fewer samples of a similar matrix, or one per case, whichever is more frequent.

Yes ✓ No ____

The RPD's were tabulated.

Yes ✓ No ____

Comments: Silver RPD = 32%

All holding times were met.

Yes ____ No ✓

Comments:

The mercury holding time was exceeded by 2 months.

contract requirements.

Yes ✓ No ____

Comments: .....

All samples were extracted and analyzed within contract holding times.

Yes ____ No ✓

Comments:

The mercury holding time was exceeded by 2 months.

Form A

Inorganic Data Completeness Checklist

- ✓ Inorganic analysis data sheets
- ✓ Instrument Detection limits
- ✓ Duplicate results
- ✓ Spike results
- ✓ ICP interference check sample
- ✓ Blank results
- ✓ Raw data for calibration standards
- ✓ Raw data for blanks
- ✓ Raw data for samples
- ✓ Raw data for duplicates
- ✓ Raw data for spikes
- ✓ Initial calibration and calibration verification results
- ✓ Continuing calibration verification